



Research Article

Section: General Surgery

Severity Grading and Management Stratification of Acute Calculus Cholecystitis with Reference to Tokyo Guideline - A Prospective Analytical Study in Tertiary Care Centre

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ABSTRACT

Introduction: Major causes of acute abdomen in the outpatient department of hospitals worldwide is an acute inflammation of the gallbladder. Acute calculus cholecystitis is defined as acute inflammation of the gallbladder, commonly caused by gallstones impacted in the cystic duct and usually associated with abdominal pain, vomiting, and fever.[1,2] Gallstones affect between 10% and 15% of the population, and of those, 1% to 4% will develop symptoms annually.[3] Tokyo guidelines were proposed for the diagnosis, severity assessment, and management recommendations of acute cholecystitis. It was published in 2006, and was revised in 2013 & 2018. **Aims:** To grade the severity of acute calculus cholecystitis and stratify the management and outcome with reference to Tokyo guidelines. **Material and Methods:** This was prospective analytical study; it was carried out on 100 patients diagnosed case of acute calculus cholecystitis admitted in the General Surgery Department at Jorhat medical college and hospital in the period from January 2023 to December 2023. **Results:** The present study showed that majority of the patients presented <72 hours of symptoms (56%) and the most common symptom in acute cholecystitis was pain abdomen and the most common sign was tenderness over right hypochondrium. Female predominance was seen with a ratio of 1.2:1. Duration of surgery increased with severity grade. Grade I (69.66±15.80)mins and grade II (84.11±15.87)mins. Postoperative complications were fewer in Grade I (3.3%) as compared to Grade II (8.8%). Hospital stay increased with severity and patients of Grade III managed conservatively had the longest hospital stay. **Conclusion:** Tokyo Guidelines allows early diagnosis and easy categorization of patients into various grades and also to determine the necessity for early cholecystectomy in case of acute cholecystitis based on the different grades defined by the guidelines. To reduce the sequelae of acute cholecystitis, Tokyo Guidelines can be followed.

INTRODUCTION

One of the major causes of acute abdomen in the outpatient department of hospitals worldwide is an acute inflammation of the gallbladder. Acute calculus cholecystitis is defined as acute inflammation of the gallbladder, commonly caused by gallstones impacted in the cystic duct.[1,2]

One of the most prevalent conditions that general surgeons address is sickness related to gallstones. Gallstones affect between 10% and 15% of the population, and of those, 1% to 4% will deve-

lop symptoms annually.[3]

Gallstones have been found in young Egyptian priestesses during archaeological digs, indicating that the condition has been recognized to affect humans for nearly 2,000 years. This information dates back to the Egyptian period.

Gentile da Foligno (1341) of Padua first demonstrated human gallstones during an autopsy in the 13th century.[5] The disease was first described in 1507 by a Florentine pathologist, Antonio Benivenius'. Anders Wenckert and Torsten Hallgren used the term

acute cholecystitis.

Acute cholecystitis patient typically present as a complain of right upper quadrant of abdomen or epigastric pain, which may radiate to the back and tip of right shoulder'. Initially, typical biliary colic tends to be dull and continuous, often severe and lasting for several minutes to hours. It is commonly accompanied by nausea, vomiting, and sometimes fever. Other symptoms related to gallstones include indigestion, increased gas, difficulty digesting fatty foods, and changes in bowel habits. In acute cholecystitis, tenderness in the right upper abdomen worsens with palpation under the right rib cage, especially during inspiration.[6]

This continued and persistent attack of acute calculus cholecystitis may result in empyema of gallbladder, mucocle of gall bladder, perforation of gallbladder ,biliary obstruction, acute cholangitis, acute pancreatitis, intestinal obstruction, peritonitis.[6]

Early detection lowers morbidity and mortality and enables timely treatment of acute cholecystitis. Numerous techniques have been established to classify the severity of acute calculus cholecystitis. For example, the American Association for the Surgery of Trauma (AAST) assigns a grade (grade I to grade V) to acute cholecystitis and manages cases according on severity[7].As a result, based on the best available data and the expert consensus reached at the International Consensus Meeting for the Management of Acute Cholecystitis held in Tokyo, the Tokyo guidelines were proposed for the diagnosis, severity assessment, and management recommendations of acute cholecystitis.[8]

The TGs use imaging results, an organ failure score, and systemic and local symptoms of inflammation to categorize biliary infections into three categories: mild, moderate, and severe. These factors are used to decide the therapeutic options and the degree of severity of the infection. Some writers have examined how using TGs affects results, but they haven't discovered any appreciable advantages, like in the case of treating cholecystitis [9]. The 2013 (Tg13) [10] and 2018 (TG18)[11] editions have included these findings, but with minor adjustments made to the severity standards and the suggested antimicrobial treatment and source control measures

Surgery is now widely recognized as the standard treatment for acute cholecystitis; however, ongoing discussions persist regarding the optimal timing for cholecystectomy. Currently, three management approaches are employed. The traditional approach entails elective surgery following initial medical treatment, allowing the inflammatory process to subside, typically during a subsequent hospital stay. Delayed cholecystectomy, the second approach, is scheduled within the same hospital admission. The third approach, early cholecystectomy, advocates for surgery as soon as possible after admission. Recent studies have predominantly focused on determining the ideal timing of cholecystectomy within the same hospital admission, specifi-

cally debating whether it should occur during the acute phase or be delayed until after several days of medical treatment.[12]

Early LC is safe and doable for acute cholecystitis with cholelithiasis, and it has the added advantage of reducing hospital stay. Patients with acute cholecystitis should be given this option, as long as an expert surgeon performs the surgery within 96 hours of the onset of symptoms, decreasing the risk of complications and readmission.[13]

Given that the majority of the recommendations' criteria can be examined and replicated in our population group, the Tokyo guidelines are a suitable diagnostic tool for acute cholecystitis that can be applied in our setup without any problems.

MATERIAL AND METHODS

Source of Data :

This was a prospective study carried out in the Department of General surgery, Jorhat Medical College and Hospital from January 2023 to December 2023.

Method of Data Collection:

- A sample size was taken based on last three years Hospital records.
- Clinically, biochemically, and radiologically diagnosed cases of acute calculus cholecystitis, which were then treated at our facility.
- Patients were made to understand and sign the informed consent form.
- Patients with acute cholecystitis were graded the severity by using Tokyo guidelines and managed accordingly.
- The results were analyzed and evaluated using statistical methods, focusing on factors such as safety, effectiveness, outcomes, complications, quality of life, and the ability to resume activities early.

Sample Size:

As per last 3 years record, considering the inclusion and exclusion criteria, average number of acute calculus cholecystitis in department of General Surgery, was 100 cases per year. For the data collection period of 12 months, therefore, the sample size for the proposed study was 100.

Methodology:

Authorization for this was acquired from the hospital's ethics committee. Between January 2023 to December 2023. All cases of acute cholecystitis presented to emergency department and Surgery OPD of Jorhat Medical College and Hospital, Jorhat who were admitted. Patients who had been diagnosed as a case of acute calculus cholecystitis were followed up and assessed using the Tokyo Guidelines criteria and the outcomes were analyzed. A comprehensive clinical proforma that comprised a complete description of the investigation of a case of acute calculus cholecystitis was used to document the clinical, laboratory, and radiologic findings. A thorough analysis was conducted on other relevant factors, clinical patterns, presentation, and treatment

-ment outcomes. Microsoft Excel software was used for data analysis and master charting, and the outcomes were interpreted.

Acute cholecystitis had a higher incidence in female as compared to male in a ratio of 1.22:1. In our study, 55 (55.0%) patients were Female and 45 (45.0%) patients were male.

1. Gender Distribution of Patients with Acute Cholecystitis

Table 1: Gender Distribution of Patients with Acute Cholecystitis

Gender	No of Patients	Percentage
Male	45	45%
Female	55	55%

2. Age Wise Incidence

In our study, 5 (5.0%) patients were <20 years of age, 12 (12.0%) patients were 21-30 years of age, 20 (20.0%)

patients were 31-40 years of age, 24 (24.0%) patients were 41-50 years of age, 32 (32.0%) patient were 51-60 years of age, 7 (7.0%) patients were 61-70 years of age.

Table 2: Table Showing Age Wise Incidence in Acute Cholecystitis

Age	No of Patients	Percentage
11-20 years	5	5%
21-30 years	12	12%
31-40 years	20	20%
41-50 years	24	24%
51-60 years	32	32%
61-70 years	7	7%

3. Duration of Symptoms in the Study Group

56% of the patients presented to medical attention <72 hours. only 44% of patients presented after 72 hours. out of

56 patients who presented within 72 hours, 32 patient presented within 24 hours and 24 presented after 24 hours.

Table 3: Table Showing Distribution of Patients

Duration of Symptoms	No of Cases	Percentage
<24 hours	32	32%
>24-72 hours	24	24%
>72 hours	44	44%

4. Symptoms in the Study Group

The most common symptom that the patients came

with were pain in the epigastrium / righ hypochondrium in 88 % of patients, followed by fever with a total of 84%

Table 4: Table Distribution Showing Percentage Distribution of Presenting Symptoms Among the Patients

Symptoms	No of Cases	Percentage
Pain abdomen	88	88%
Fever	84	84%
Nausea and Vomiting	24	24%
Right Upper Quadrant Lump	19	19%
Anorexia	60	60%
Jaundice	14	14%

5. Signs in the Study

Most common sign elicited in patients with acute cholecy-

stitis was abdominal tenderness over right hypochondrium (88%). Murphy's sign was elicited in 63% of the patients.

Table 5: Distribution Showing Percentage Distribution of Signs Among the Patients

Signs	No of Cases	Percentage
Icterus	14	14%
RHC/Epigastric tenderness	88	88%
Right Upper Quadrant Mass	19	19%
Murphy's sign	63	63%

6. Ultrasonogram Findings in the Study Group.

Enlarged gallbladder was found in a total of 65 (>4 mm) found in 52% of patients patients It is the most consistent ultrasound finding of

cholecystitis followed by thickening of gallbladder wall

Table 6: Table Showing Distribution of Ultrasonogram Findings in Acute Cholecystitis

Ultrasonogram Findings	No of Cases	Percentage
Thickening of gallbladder wall	52	52%
Enlarged gallbladder	65	65%
Ultrasonography Murphy's sign	11	11%
Pericholecystic fluid	46	46%
Debris echo	5	5%
Gas imaging	3	3%

7. Grading of the Disease:

The majority of the patients in the study group had grade II

cholecystitis (moderate).. More than 50% of the study population had grade II disease at the time of presentation.

Table 9: Showing the Distribution of Patients in Various Grades of Severity

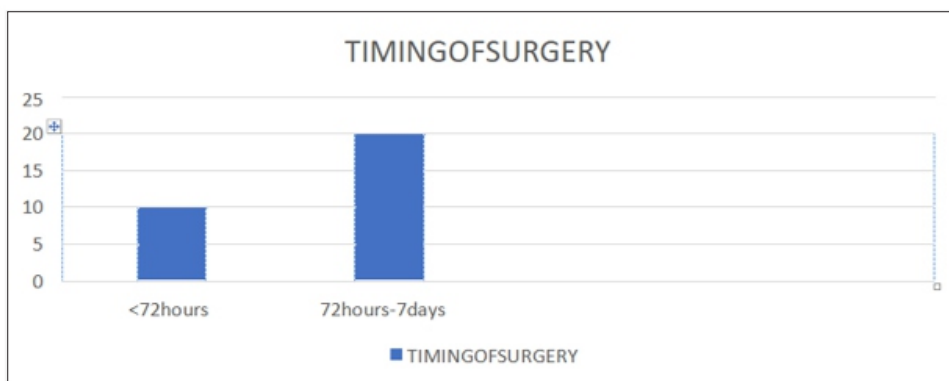
Severity Grade	Acute Cholecystitis	
Grade I	30	30%
Grade II	68	68%
Grade III	2	2%

8. Management in Grade I (Mild) Patients :

Total Number of Patients: 30 Timing of Surgery

The surgery was done within 72 hours from onset of symp-

oms for 10 patients and 20 patients were operated after 72 hours and within 7 days from onset of symptom.



Timing of Surgery in Grade I Acute Cholecystitis

Type of Surgery in Grade I Patients:

Laparoscopic cholecystectomy was planned for 30 patients

of which 28 patients successfully underwent the procedure and it was converted to open in 2 patient

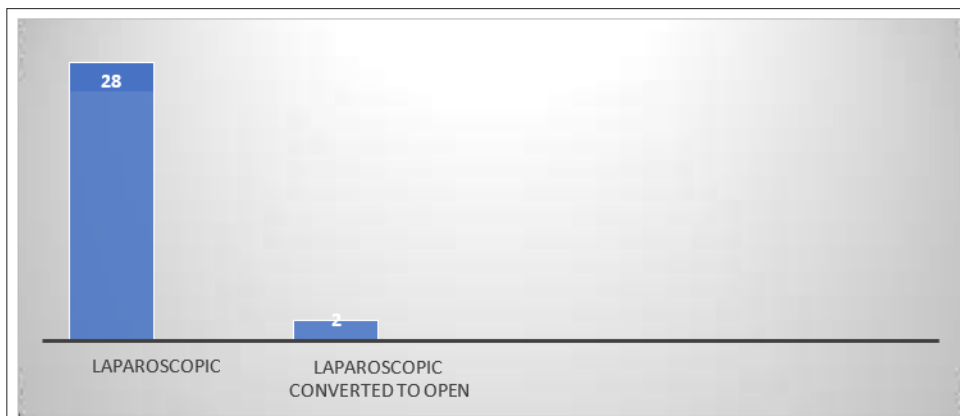


Figure 2: Bar Diagram Representing Distribution of Patients Based on Type of Surgery in Grade I Acute Cholecystitis.

9.Management Outcomes in Grade II (Moderate) Patients : Total Number of Patients: 68

hours for 16 patients, 52 patients underwent surgery after 72 hours and upto 7 days.

Timing of Surgery : The surgery was done within 72

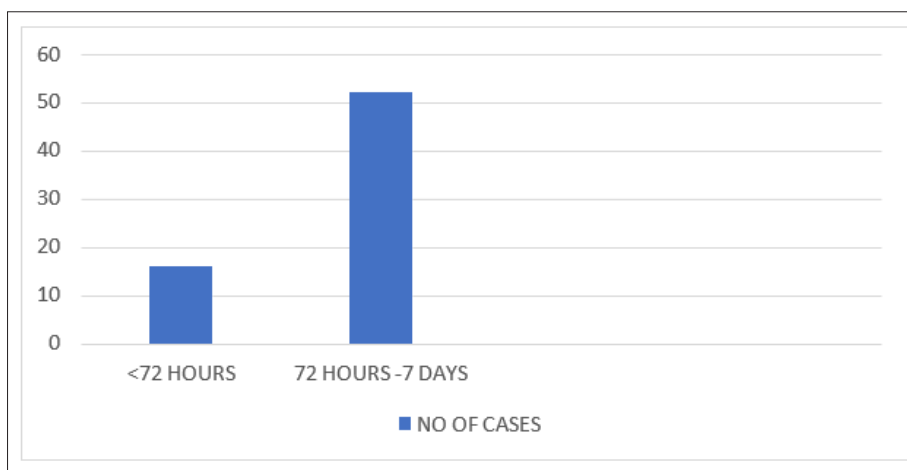


Figure 3: Bar Diagram Showing Distribution of Patients Based on Timing of Surgery in Grade II Acute Cholecystitis.

Type of Surgery in Grade II Patients :

In the present study, laparoscopic cholecystectomy was planned for 63 patients of which 9 patients were converted to

open. 5 patients underwent open cholecystectomy. The major reason for conversion was frozen Calot's.

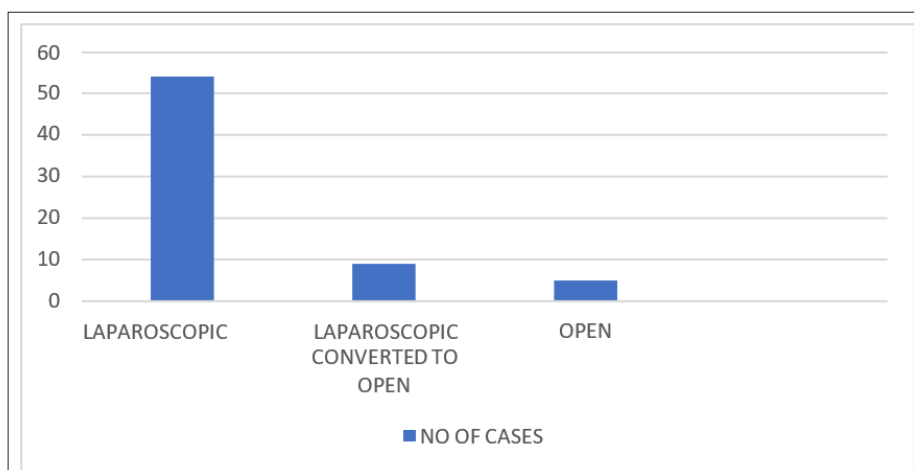


Figure 4: Bar Diagram Representing Distribution of Patients Based on Type of Surgery in Grade II Acute Cholecystitis.

9. Management Outcomes in Grade III (Severe) Patients:

There were 2 patients of grade III severity of acute cholecystitis, both of which underwent conservative management with antibiotics, analgesics and intravenous fluid and were discharged with plan for interval cholecystectomy.

10. Intra Operative Findings in Operated Group of Patients :

Among 30 patients of grade I, 4 patients had inflamed gallbladder and 11 patients had frozen Calot's triangle. In grade II patients, 18 patients had inflamed gallbladder, 6 had frozen Calot's, 4 had gangrenous cholecystitis and 9 had empyema gallbladder

Table 10: Showing the Intraoperative Findings in the Operated Group of Patients

Intra Operative Finding	Grade I(n=30)	Grade II(n=68)
Inflamed Gallbladder	4	18
Frozen Calot's	11	6
Gangrenous Cholecystitis	-	4
Empyema	-	9

11. Intra Operative Findings in Operated Group of Patients :

Among 30 patients of grade I, 4 patients had inflamed gallbladder and 11 patients had frozen Calot's triangle. In grade II patients, 18 patients had inflamed gallbladder, 6 had frozen Calot's, 4 had gangrenous cholecystitis and 9 had empyema gallbladder.

DISCUSSION

Acute cholecystitis is one of the most common causes of acute abdomen presented in the emergency as well as the outpatient department. Till the formulation of Tokyo Guidelines in 2006 which was later revised in 2013 there was no definitive protocol for management of the disease. The Tokyo guidelines states the various grades of severity and management according to the grades.

The present study comprises of 100 patients undergoing management for acute cholecystitis following Tokyo Guidelines in Jorhat Medical College and Hospital during the period of 12 months from 1st January 2023 to 31st December 2023. An attempt has been made to discuss the age incidence, sex incidence, symptomatology, investigation and the result of the outcome of management following Tokyo guidelines.

In our study female predominance was seen with a ratio of 1.2:1 which was consistent with various studies by Joseph et al., Kamalapurkar et al., Gerard et al., Naidu et al., and Loozen et al.

In the present study, it was found that the severity increased with age, with grade I having a mean age of 39.96(± 12.62) years, grade II of 49.32(± 12.43) years and Grade III with mean of 63 years. The findings were consistent with the study by Cheng et al., Saito et al., Paul Wright et al and Ambe et al.

The present study showed that majority of the patients presented <72 hours of symptoms (56%), it was consistent with the studies by Paul Wright et al., Cheng et al., Kamalapurkar et al., Terho et al and Joseph et al.

In the present study, it was found that the most common symptom in acute cholecystitis was pain abdomen (88%)

which was consistent with the findings in the study by C Chau et al., Cheng et al., Lee SW et al., Vigna et al. , Inoue et al., Amirthalingam et al, and Thapar et al.

In the present study, it was found that the most common sign was tenderness over right hypochondrium/epigastrium (88%) which was consistent with the study by C Chau et al, Cheng et al., Ambe et al., Paul Wright et al., Vigna et al., Amirthalingam et al., Joseph et al..

Ultrasonography was a crucial step to arriving at a final diagnosis. In the present study, majority of patients had enlarged gallbladder i.e. 65% followed by thickening of gallbladder found in 52% which was consistent with the study by Lee SW et al., Beksac et al., Inoue et al, and Bekki et al.

In the present study, only 2 patients had raised serum creatinine both of whom belonged to Grade III which was similar to study by Cheng et al where 9/103 patients had raised serum creatinine all of whom were of Grade III severity, Amirthalingam et al wherein 2/149 patients both belonging to Grade III had elevated serum creatinine and Thapar et al 44 where it was elevated in 32.4 % patients all belonging to Grade III.

According to Tokyo guidelines, acute cholecystitis can be divided into mild, moderate and severe. In this study, majority of the patients were of moderate severity i.e. Grade II which was also found in studies by Asai et al., Paul wright et al., Inoue et al., Massoumi et al., Gerard et al and Lin Yu Ning et al'.

In the present study, amongst the 30 patient of Grade I severity of acute cholecystitis, majority of the patients underwent laparoscopic cholecystectomy after 72 hours with only 2 patient having conversion to open cholecystectomy who was operated after 72 hours upto 7 days. As compared to other studies by Asai et al., Paul Wright et al., Massoumi et al., Saito et al., Bekki et al, and Lin, Yu Ning et al', lesser number of patients were operated within 72 hours which is not consistent with the other studies, however, the conversion rate was comparable to other studies.

In the present study, amongst the 68 patients of Grade II severity of acute cholecystitis, majority of the patients i.e. 63 were planned for laparoscopic cholecystectomy of which only 9 patients were converted to open cholecystectomy. 52 patients were operated after 72 hours. As compared to other studies the conversion rate was comparable to studies by Asai et al., Paul Wright et al., Massoumi et al., Saito et al., Bekki et al, and Lin, Yu Ning et al, but they also showed that lesser number of patients were operated after 72 hours which is not consistent with our study.

CONCLUSION

From the prospective Analytical study on 100 patients of acute cholecystitis carried out over a period of 12 months' the following conclusions can be drawn.

1. Given that the majority of the parameters in the recommendations can be examined and replicated in our demographic group, the Tokyo recommendations is a suitable tool for the diagnosis of acute cholecystitis that can be employed in our setup without any problems'.

2. Based on the various grades established by the Tokyo Guidelines, patients can be easily diagnosed, easily categorized into different grades, and informed about the need for an early cholecystectomy in the event of AC

3. The Tokyo Guidelines can be followed to reduce the complications associated with treating acute cholecystitis

4. When patients with AC were treated in accordance with recommendations, their clinical outcomes showed promise in terms of a brief hospital stay and the least amount of problems following surgery.

5. In cases of AC, ELC is typically recommended. But in circumstances of late presentations and higher marks, it is perceived as challenging.

6. When done sooner rather than later, the conversion rate is lower. Therefore, it is possible to predict conversion and provide the patient with appropriate counseling when specific criteria, such as male gender, advanced age, the existence of comorbidities, and prolonged symptom duration, are present.

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